

MAEKAWA et al
Appl. No. 10/022,801
October 28, 2003

REMARKS/ARGUMENTS

Reconsideration of this application is requested. Claims 1-15 will be active in the application subsequent to entry of this Amendment.

The claims have been amended in order to more particularly point out and distinctly claim that which applicants regard as their invention and to emphasize characterizing features of the invention. More specifically, the squareness (σ_r/σ_s) value of at least 0.52 up to 0.55, previously the subject of original claim 6, has been incorporated into independent claims 1, 9-11 and 13. Consequential changes have been made to claim 6. New claims 14 and 15 have been added, both independent claims and both featuring a rotational hysteresis integral value of not more than 1.0 which is the subject of original claim 4. Basis in the original disclosure for new claims 14 and 15 will be apparent.

Attached is the evidentiary declaration of inventor Ota made October 23, 2003. The significance of this declaration and the data presented in it is discussed below.

In items 1 and 2 of the Official Action the examiner questions enablement with respect to the characteristic of "activation volume", urging that the specification fails to provide an adequate description as to how the claimed value of activation volume is achieved or controlled. In fact, this is a characteristic of the particles of the present invention and results from particles produced according to procedures described in applicants' specification. The characteristic itself, and its measurement, are discussed on pages 20-21 of the specification generally and more particularly at pages 48-50 of the specification with regard to characteristic (8). There is also a discussion of this characteristic in item 8 of inventor Ota's declaration.

For completion of the record the following articles are attached:
Nishio, "Magnetic Aftereffects of Co- γ -Fe₂O₃ Fine Particles", Journal of the Magnetics Society of Japan, Vol. 15 Supplement, No. S2 (1991);

MAEKAWA et al
Appl. No. 10/022,801
October 28, 2003

Nishio, "Magnetic Aftereffects of Particles for High-Density Magnetic Recording Media", Journal of the Magnetics Society of Japan Vol. 13, Supplement, No. S1 (1989); and

Nishio, "Magnetic Viscosity in High-Performance Permanent Magnets and High-Density Magnetic Recording Media", Vol. 22, No. 1, 1998, pp. 3-11

which relate to activation volume or components such as S_V from which it is calculated.

Thus, one of ordinary skill in the art following the description of this application will be able to provide particles of spindle-shaped magnetic iron-based alloy particles containing cobalt and iron as the main components and having the characteristics defined by applicants' claims, including the appropriate activation volume. Reconsideration is requested.

Applicants' claims are directed to spindle-shaped magnetic alloy particles containing Fe and Co as the main components and have a cobalt content of 20 to 50 atm%, calculated as Co, based on whole Fe; an average major axis diameter (L) of 0.03 to 0.10 μm ; a coercive force value of 159.2 to 238.7 kA/m (2,000 to 3,000 Oe); a crystallite size of 100 to 160 \AA ; an activation volume (V_{act}) of 0.01 to 0.07E-4 μm^3 ; and a squareness (σ_r/σ_s) of 0.52 to 0.55.

These spindle-shaped magnetic alloy particles are fine particles, and exhibit not only a high coercive force and an adequate saturation magnetization value in spite of a small crystallite size, but also a small rotational hysteresis integral value.

The activation volume (V_{act}) of the spindle-shaped magnetic alloy particles of the present invention is 0.01 to 0.07E-4 μm^3 , and the squareness (σ_r/σ_s) is 0.52 to 0.55 previously the subject of claim 6, now incorporated into claims 1, 9-11 and 13 as well as new claims 14 and 15.

When the activation volume is more than 0.07E-4 μm^3 , the desired reduction in noise in the short wavelength region may not be sufficiently achieved. Also, when the activation volume is less than 0.01E-4 μm^3 , the resulting spindle-shaped magnetic alloy particles may suffer from considerable deterioration in saturation magnetization value

MAEKAWA et al
Appl. No. 10/022,801
October 28, 2003

and oxidation stability, and simultaneously do not provide a high coercive force. Further, since the time decay in recording quality due to thermal fluctuation cannot be ignored, the resulting particles having such a small activation volume are not suitable for use as recording media.

Claims 1-5 and 7-13 (only) stand rejected as being anticipated by U.S. patent 5,989,516 in the name of Okinaka and Ota. Both patentees are applicants in respect to the present application and of them, Mr. Ota provides evidence in his declaration accompanying this response. The subject application is owned by the owners of the present application, thus the present applicants are well familiar with the content of the reference cited and applied in item 4 of the Official Action.

Counsel observes that claim 6 is not included in this rejection, and as the squareness (σ_r/σ_s) of 0.52 to 0.55 is now incorporated into independent claims 1, 9-11 and 13 it is submitted that by virtue of this Amendment claims 1-5 and 7-13 are not regarded as being anticipated.

Applicants' claims also incorporate other characterizing features which distinguish them from the disclosures of the cited reference.

U.S. Patent No. 5,989,516 discloses spindle-shaped magnetic iron-based alloy particles containing cobalt and iron as the main ingredients, in which the Co content is 1.0 to 50.0 atm% (calculated as Co) based on the total Fe in the spindle-shaped magnetic iron-based alloy particles. These particles have an average major axis diameter of 0.05 to 0.20 μm , a size distribution (standard deviation/major axis diameter) of not more than 0.25, an average minor axis diameter of 0.010 to 0.020 μm , an aspect ratio (major axis diameter/minor axis diameter) of 4 to 15, an X-ray crystallite size D_{110} of 120 to 180 \AA , a coercive force of 1720 to 2500 Oe, a saturation magnetization of not less than 110 emu/g, a saturation magnetization decrement percentage of not more than 17 %, and squareness (σ_r/σ_s) of not less than 0.500.

It is true, U.S. Patent No. 5,989,516 discloses properties shared by the particles of the present invention, such as that the squareness (σ_r/σ_s) of the spindle-shaped magnetic

MAEKAWA et al
Appl. No. 10/022,801
October 28, 2003

iron-based alloy particles containing cobalt and iron as the main ingredients is not less than 0.500, and the squareness (σ_r/σ_s) of the spindle-shaped magnetic iron-based alloy particles of the examples of U.S. Patent No. 5,989,516 is in the range of 0.500 to 0.518. In U.S. Patent No. 5,989,516, there is no description nor suggestion concerning the spindle-shaped magnetic iron-based alloy particles containing cobalt and iron as the main ingredients have a squareness of at least 0.520 as required by applicants' claims 1-13, as above amended.

Accordingly, applicants' spindle-shaped magnetic alloy particles containing Fe and Co as main components are novel.

Inventor Ota's declaration shows the activation volume (V_{act}) of the spindle-shaped magnetic iron-based alloy particles containing cobalt and iron as the main ingredients of U.S. Patent No. 5,989,516 is $0.089E-4 \mu m^3$, which is out of applicants' claimed range of 0.01 to $0.07E-4 \mu m^3$. Further, the rotational hysteresis integral (Rh) of the spindle-shaped magnetic iron-based alloy particles containing cobalt and iron as the main ingredients of U.S. Patent No. 5,989,516 is 1.38 which is out of the range of not more than 1.0 as required by applicants' claims 14 and 15. Accordingly, the spindle-shaped magnetic alloy particles containing Fe and Co as main components of the present invention are novel.

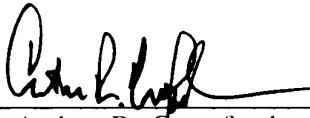
Further, U.S. Patent No. 5,989,516 provides no teaching nor suggestion about a small rotational hysteresis integral value as in the present invention. So, one of ordinary skill in the art can not foresee the spindle-shaped magnetic alloy particles containing Fe and Co as main components of our invention from the disclosures of U.S. Patent No. 5,989,516.

For the above reasons it is respectfully submitted that the claims of this application define inventive subject matter. Reconsideration and allowance are solicited.

MAEKAWA et al
Appl. No. 10/022,801
October 28, 2003

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: 
Arthur R. Crawford
Reg. No. 25,327

ARC:eaw
1100 North Glebe Road, 8th Floor
Arlington, VA 22201-4714
Telephone: (703) 816-4000
Facsimile: (703) 816-4100